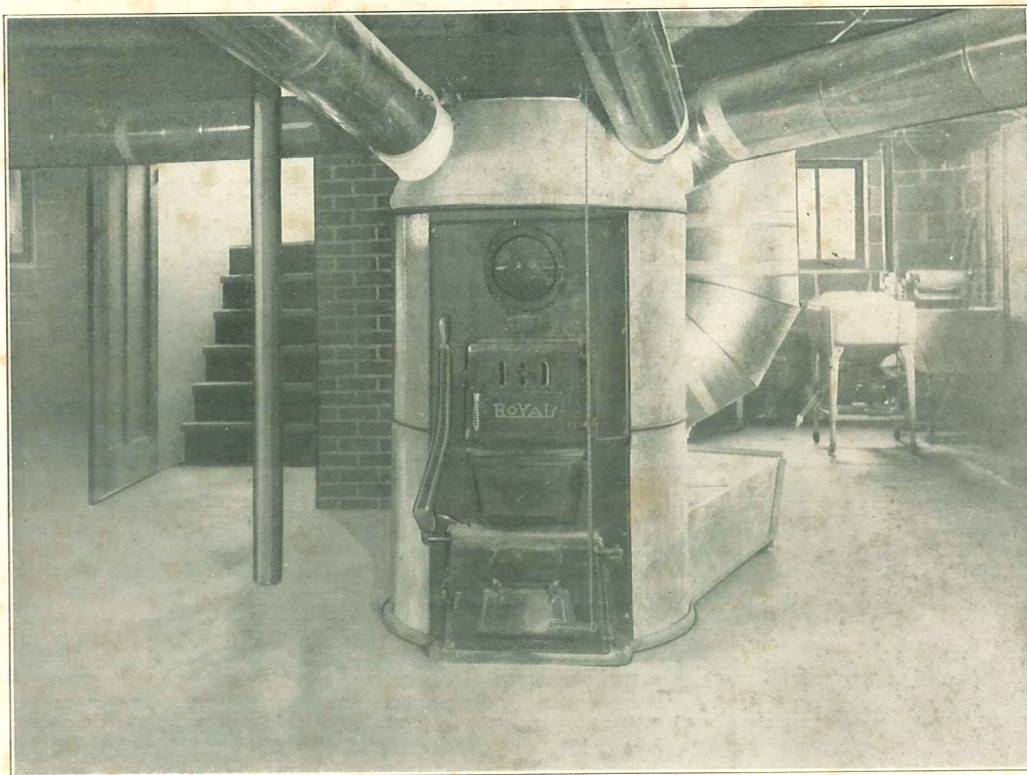




ROYAL

WARM AIR FURNACES

MANUFACTURED BY
HART & CROUSE CO. UTICA, N.Y.



The Royal Makes the Basement Attractive

Color in a warm air furnace is indeed new, but it is sure to prove one of the most important developments in recent years. An attractive heating plant presents advantages quickly appreciated by every home owner.

The ROYAL Furnace is finished in a handsome gold-brown and gold. Its rich appearance is fully in keeping with the high quality always built into the ROYAL.

The modern trend is for the home owner to make greater use of the basement. No longer does it remain a necessary, but uninviting part of the home. It is rapidly being developed into comfortable, tenantable space. It is not unusual to find that the basement has been converted into a play room for the children, a billiard room or a home gymnasium. Amid such surroundings the appearance of the furnace cannot be ignored. It must be in keeping with its improved surroundings. The handsome ROYAL Furnace needs no attention in this respect. It comes complete for use in the finest of basements.

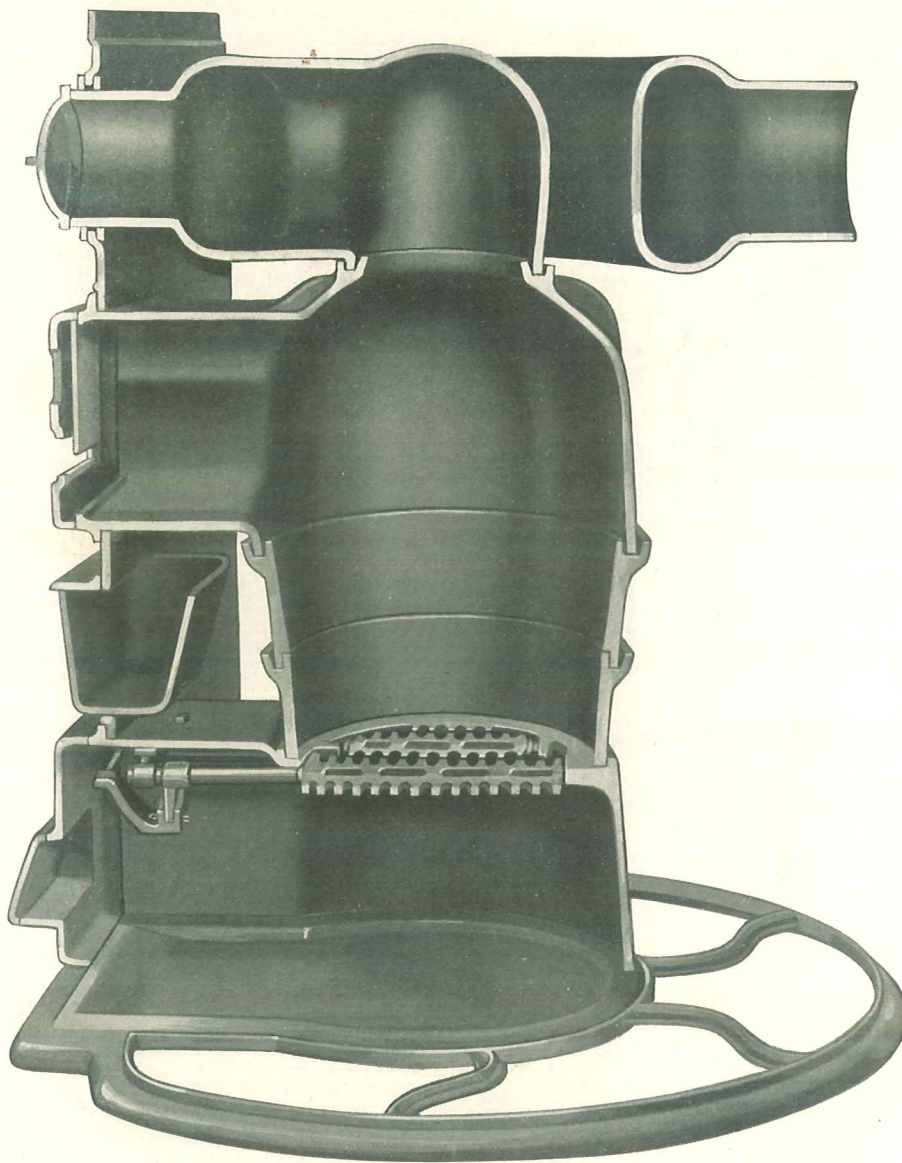
The real estate dealer, the builder and the home owner realize the importance of having an attractive heating plant in the home they are selling. It increases the value of the home considerably.



The Royal Furnace With Casing Cut Away

A view of the ROYAL Furnace with casing cut away, discloses its superior features. A powerful, substantial furnace, carefully designed for highest efficiency, it represents the result of our long manufacturing experience. The generous air chamber and the smoothly curving contours of the castings provide for a constant flow of evenly temperatured warm air to all the rooms of the home.

Designed to eliminate the possibility of gas and ash dust leakages, equipped with modern operating conveniences, and finished in a handsome two-color scheme, the ROYAL presents the ideal heating plant for the home.

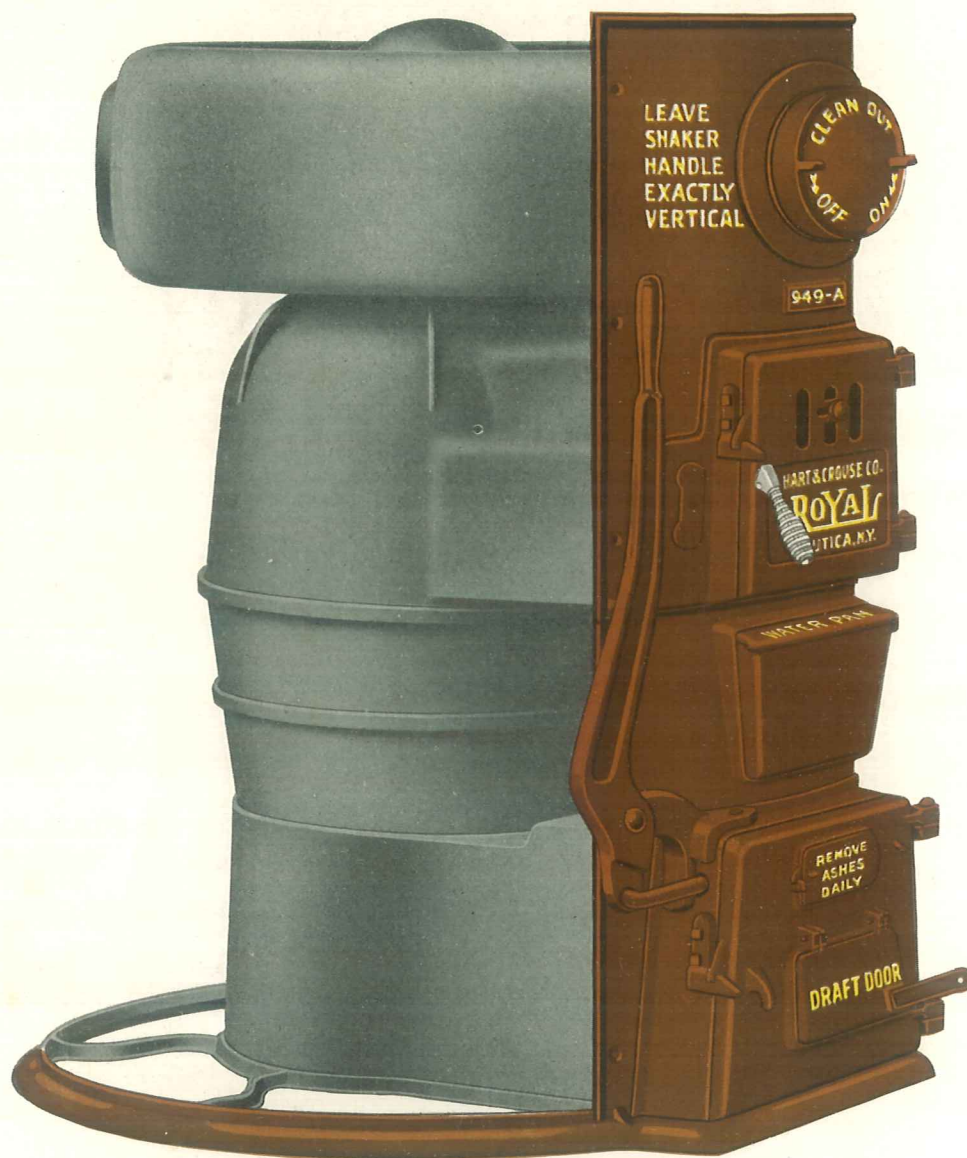


Cross-Section View of the Royal Furnace

The cross-section view of the ROYAL illustrates in detail its excellent proportions. Here are the answers to its acknowledged fuel economy, high heating capacity and long life.

The Royal Is Well Designed For Burning Oil

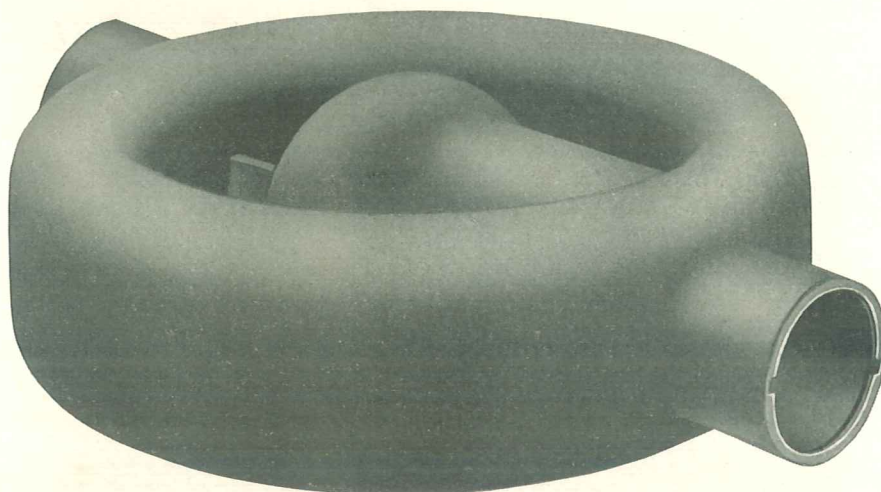
The large combustion space, ample heating surface and sturdy construction of the ROYAL present a design essential for best results. The one-piece design of the ashpit, combustion chamber, and radiator, together with the gas and dust proof design of the panel fronts afford additional factors whose advantage is quickly appreciated by the oil burning engineer.



Castings of the Royal Gold-Brown and Gold Furnace

Many furnaces look alike when fully cased. Remove the casing and the differences quickly appear. The design and construction of the castings determine the amount of heat the furnace will produce, the amount of coal burned, and whether the heating system will be free from gas and dust leakages.

Careful inspection of the ROYAL Furnace castings is invited, for their design is the reason for the economy in fuel, efficiency in heat produced, and the elimination of gas and dust leakages to the rooms of the home.

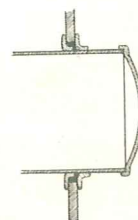


One-Piece Cast Radiator

The one-piece design permanently eliminates gas and dust leakage to the rooms of the home and affords years of uninterrupted service. The radiator is manufactured by means of the most modern mechanical equipment, insuring an even metal line at all times.

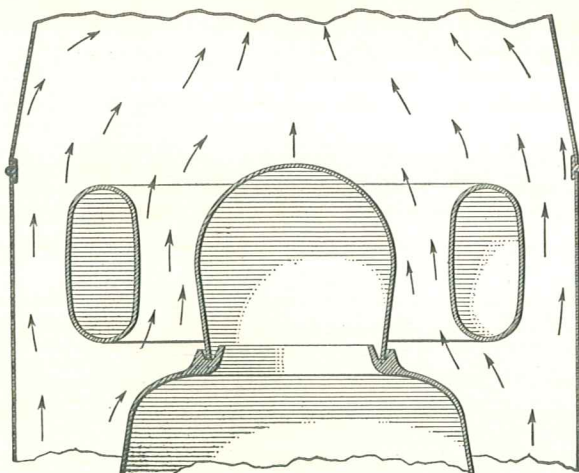
The unusually large free air space around and *through* the radiator insures full use of the most heat from the fuel burned. The streamline design presents a large amount of heating surface and moreover surface of maximum effectiveness.

The smooth contours of the radiator offer least resistance to the upward travel of warm air -- no flat surfaces or flanges cut down the free area. In addition, the fire travel design compels equal temperatured air at all parts of the furnace air chamber.



The cleanout neck is permanently gas tight

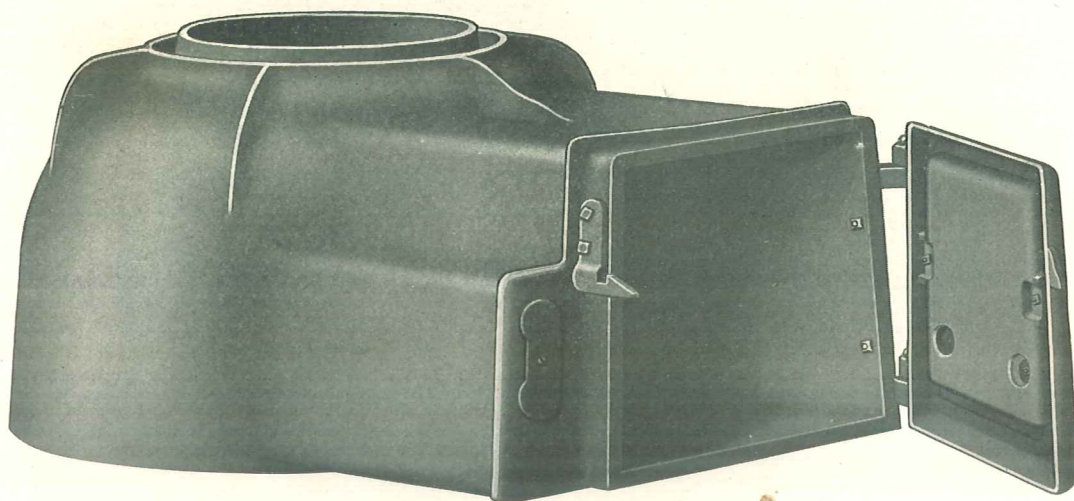
The cleanout extends either through the panel front or through



The warm air passes effectively around and through the radiator

the casing. The cleanout neck is wrapped with asbestos rope held firmly in place by two cast iron collars. This gives a permanently gas tight connection, either at the panel front or at the casing.

Unrestricted passage of the flue gases is afforded by the generous flue areas and the large dome. The curved dome of the radiator carefully guides the gases into the flue area. The large center opening at the feed section increases combustion efficiency and saves fuel.



Large One-Piece Combustion Chamber

The one-piece combustion chamber is dome shaped and unusually large. Its sides are nearly straight. This design gives ample room for the combustion of the gases of the fire, effecting not only high furnace efficiency, but fuel economy.

The under part of the feed section throat is cast integral with the combustion chamber -- no joints to leak gas and dust. The extra deep radiator cup joint provides a positive gas tight joint.

The feed door is unusually large for convenient firing. It contains a "hot blast" feature by which the air is preheated and admitted at the spot essential for securing complete combustion. The feed door is hung on individual hinges and catches which are easily replaced when desired and at minimum cost. The air-cooled door handle hangs away from the door to prevent it ever becoming too hot to grasp. Burned fingers never result.

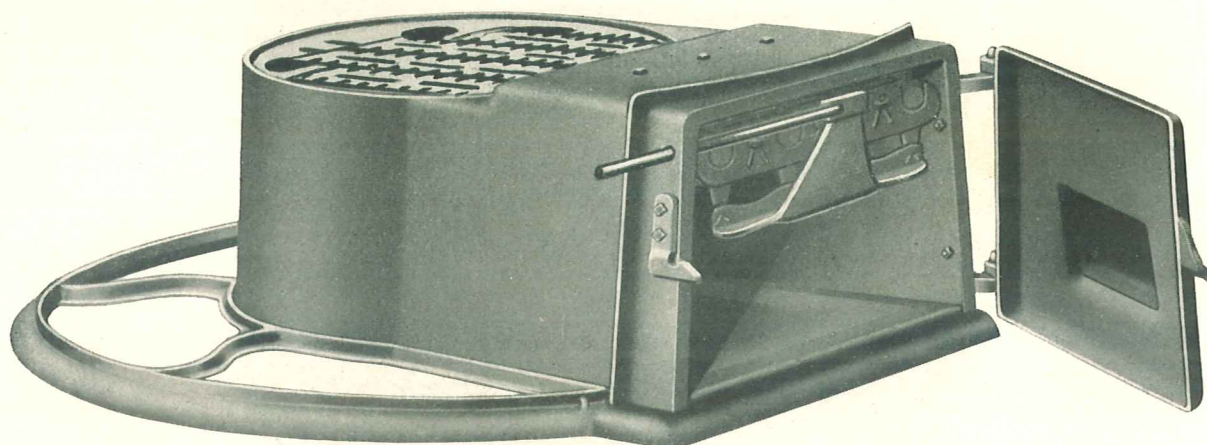


The "hot blast" in the feed door



The feed door opening and door are surface-ground until they fit accurately and tightly. Brass hinge pins give long life to the doors and frames.

The throat of the combustion chamber extends through the upper panel front as illustrated at the left. The panel front locks quickly into place requiring no cement or bolts. The high bead on the combustion chamber positively seals the joints against any dust seepage to the air chamber.



• *Base, Ashpit and Grates*

The one-piece ashpit is deep and roomy. This is important, as it saves the possibility of burning out grates, due to failure to remove ashes often enough.

The door is extra large, being the full size of the ashpit. Ashes can be removed easily. Both the ashpit door opening and the door are surface-ground until they fit absolutely tight. The hinge pins are of brass -- they do not rust or corrode during the summer months when the furnace is idle. The doors are hung on individual hinges and catches that can be replaced easily and at minimum cost.

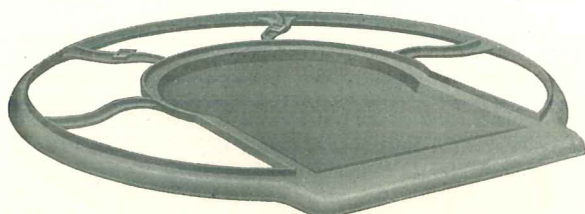
The throat of the ashpit extends through the panel front. The lower panel front slides down over the throat and is held in place without cement or bolts. The high bead on the front of the ashpit seals the joint against any dust seepage to the air chamber.



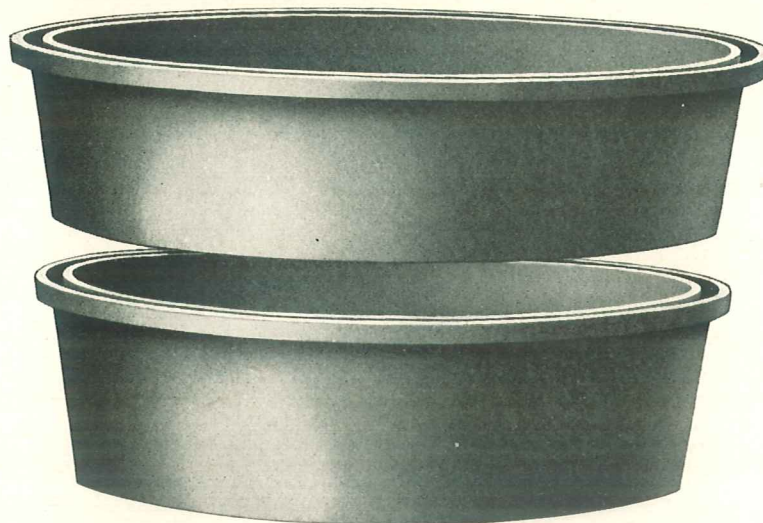
*Individual hinges,
easily replaced*

The grates are operated by a waist-high lever shaker. The shaker is sturdy and durable, and is so balanced that complete shaking of the grate results easily. The improved grates are of the heavy, clinker-crushing type, scientifically designed to burn the fuel most effectively. An individual grate may be removed without disturbing the others. No bolts are used in the grate assembly.

One-Piece Base

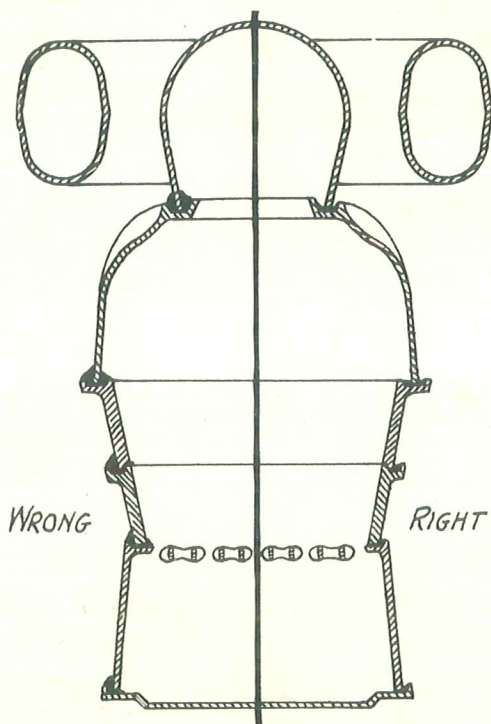


The one-piece, watertight construction reduces the erection time. When the floor is uneven, as is often the case, it forms an unyielding foundation for the erection of the furnace, and eliminates the possibility of parts shifting in years to come.



Heavy, Two-Piece Firepot

The heavy, two-piece firepot is built to render years of satisfactory service. The wide, deep cup joints allow for expansion and contraction and prevent breakage. The firepot sides are as nearly straight as is practicable. This prevents the accumulation of ashes which restrict radiation of heat.



How to Cement the Furnace

Care exercised in cementing a furnace joint will be well repaid. The right half of the illustration is of a correctly cemented furnace.

To secure this result, first, clean the cup joint by wiping it with a damp cloth. Next cover well the base of the joint with cement -- do not fill the joint, use just enough cement to seal it. Place the next casting in position and have it seat evenly. Do not put additional cement in the joint.

When the cement is dry this joint is perfectly tight. During the use of the furnace ash dust and soot will fill the inside of the cup joint and prove best for the joint.

The left half of the illustration is of a usual, but incorrect, way of cementing. These joints contain too much cement, which will result in a flaking and crumbling of the cement under heat, leaving an exposed joint.



The Royal Gold-brown and Gold Pipeless Furnace

Built throughout in the same quality way as the pipe furnace. Generous return air space is provided to promote free flow of warm air. The ROYAL Gold-brown and Gold Pipeless Furnace has the convenient upright shaker.

The pipeless furnace is regularly furnished with Black Japanned Register, but can be furnished when desired with an Oxidized Copper Register.

The pipeless is particularly well suited for compact homes, for stores, churches and other buildings which can be best heated by one register.

Economy for the Owner

1. No joints where leakage is possible. No gas, no smoke, no dust -- *greater comfort in the home.*
2. Extra large combustion chamber, greater efficiency -- *saves fuel.*
3. Design of radiator requires long gas travel -- *greater heat.* Large dome and radiator opening -- *freedom for gas travel.*
4. Deep Ashpit. *Prevents burning out grates.*
5. Heavy rocking grates -- *makes clinker crushing easy.* Revolving grates furnished when desired.
6. Balanced waist-high shaker -- *easy grate operation without possibility of ash dust annoyance.*
7. Air-cooled feed door handle -- *no more burned fingers.*
8. Extra large feed door and ashpit door -- *facilitates carrying for furnace.*
9. Brass hinge pin on doors -- *saves rusting and repair.*
10. A handsome finish for the furnace -- *makes basement attractive and increases the value of home.*



**Why the ROY
Heating Plant**

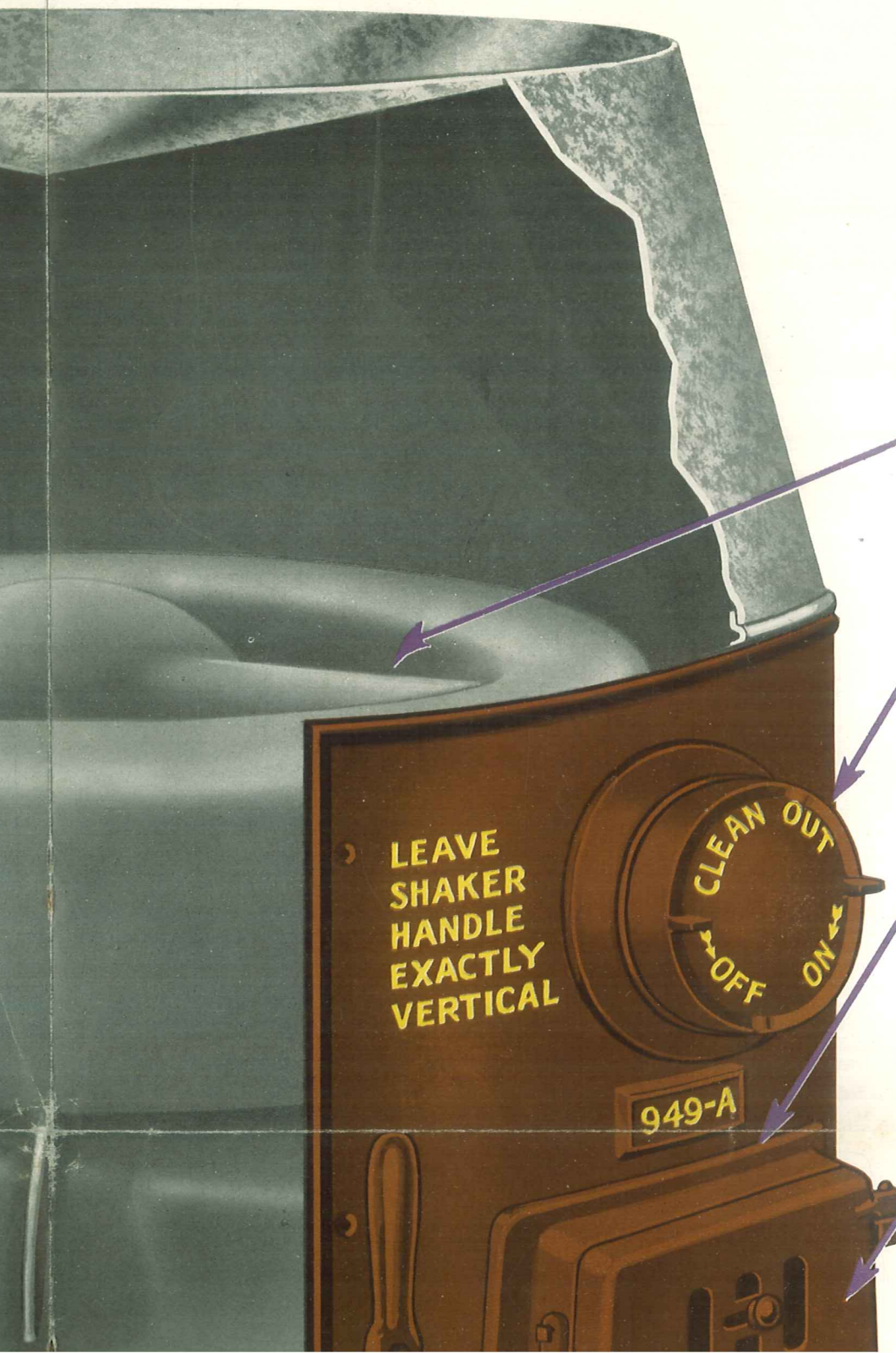


ROYAL is the Best
for Your Home

Economy for the Dealer

1. Only four joints to be cemented -- these are all cup joints. *No Vertical Joints.*
2. One-piece construction -- Panel fronts fit in place without bolts or cement. *This reduces the erection time one-third.*
3. One-piece Base -- *saves erection time.* If cellar floor is uneven it gives a firm, even foundation upon which to erect the furnace.
4. Casing Rings, especially designed for the Royal Furnace. Require no fitting. Already shaped to the casing, they save a great deal of time in the set-up.
5. Standardized -- feed door, ashpit door, front panel, humidifier, cleanout cap and cleanout collars are interchangeable with any other size ROYAL Furnace. This feature *increases dealer's service without increasing his overhead.*
6. A furnace in which oil can be burned with excellent results.
7. The color scheme makes the ROYAL appealing to the builder, the realtor and the home owner. It increases the value of the home.

ROYAL is Better!



Large Air Circulating Space

Streamline construction multiplies radiating powers.

Cleanout Connection

The radiator cleanout extends through panel front, giving convenient access for cleaning radiator. The cleanout neck is gas and dust tight, being sealed with asbestos rope.

Front Panel

slips in place without bolts. No cement, no leakage of gas. Throat of feed section extends through front panel.

Standard for all sizes

Large Feed Door

Easy to fire. "Hot Blast" construction gives perfect combustion. Feed section extends through front panel, making gas leakage impossible. Illustration on page 8 shows how front panel fits over feed section. All doors in Royal Furnaces are surface ground.

Standard for all sizes pipe or pipeless

Why the RoY

Extra Large Dome

and radiator opening. Completes the combustion of any escaping gases.

Casing Rings

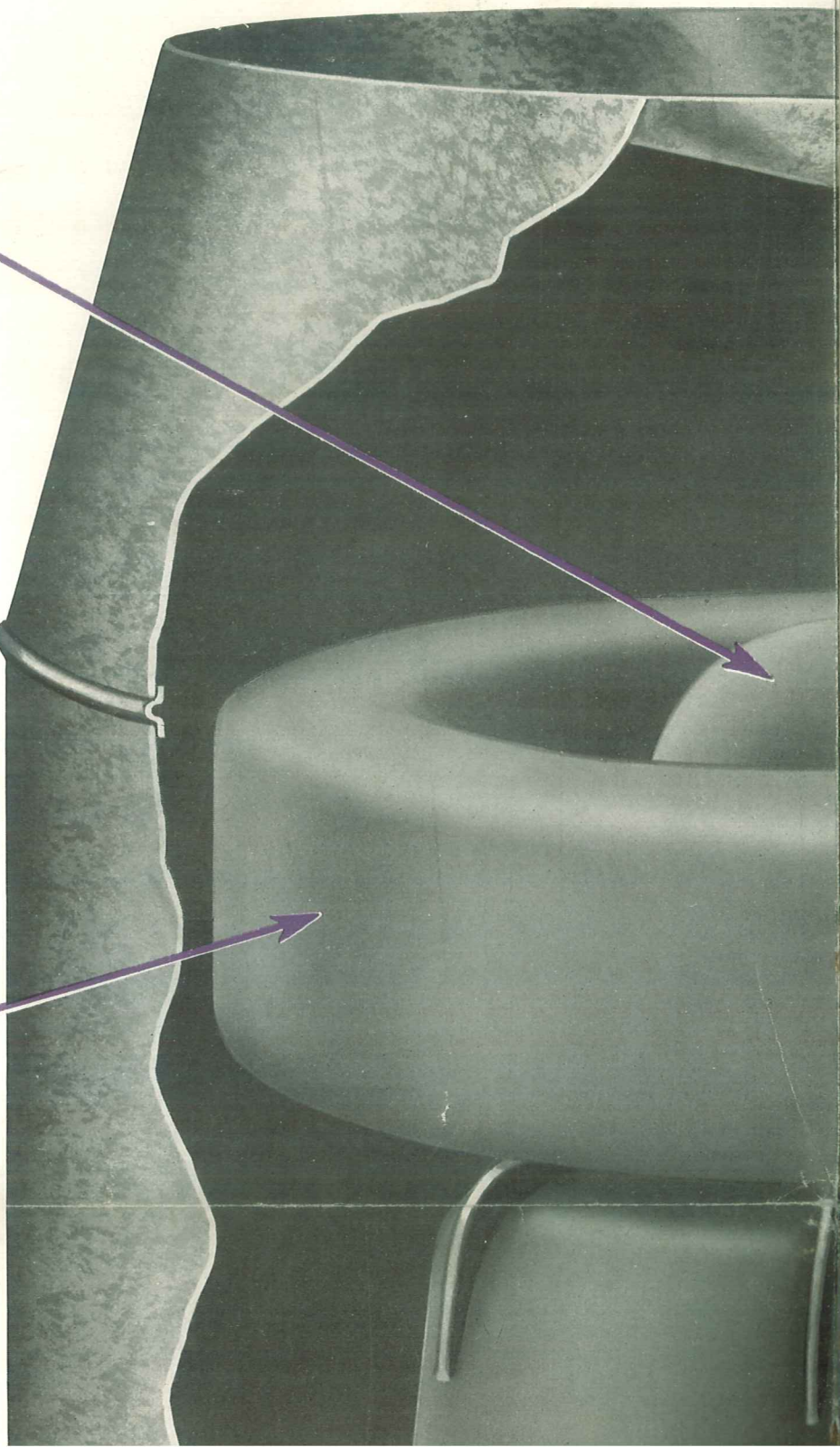
Fitted to the casings saves labor.

One-Piece Cast Iron Radiator

The only permanently gas tight construction. Design requires long gas travel, insuring high heating power.

Standard for pipe or pipeless

One-Piece Combustion Chamber



One-Piece Combustion Chamber

Extra height and straight sides provide large combustion space. Deep cup joint on top eliminates gas leakage.

Standard for pipe or pipeless

Two-Piece Fire Pot

Straight sides prevent accumulation of fire clogging ashes. Deep cup joint eliminates gas leakage. Two-piece construction. No breakage due to expansion and contraction of metal.

Standard for pipe or pipeless

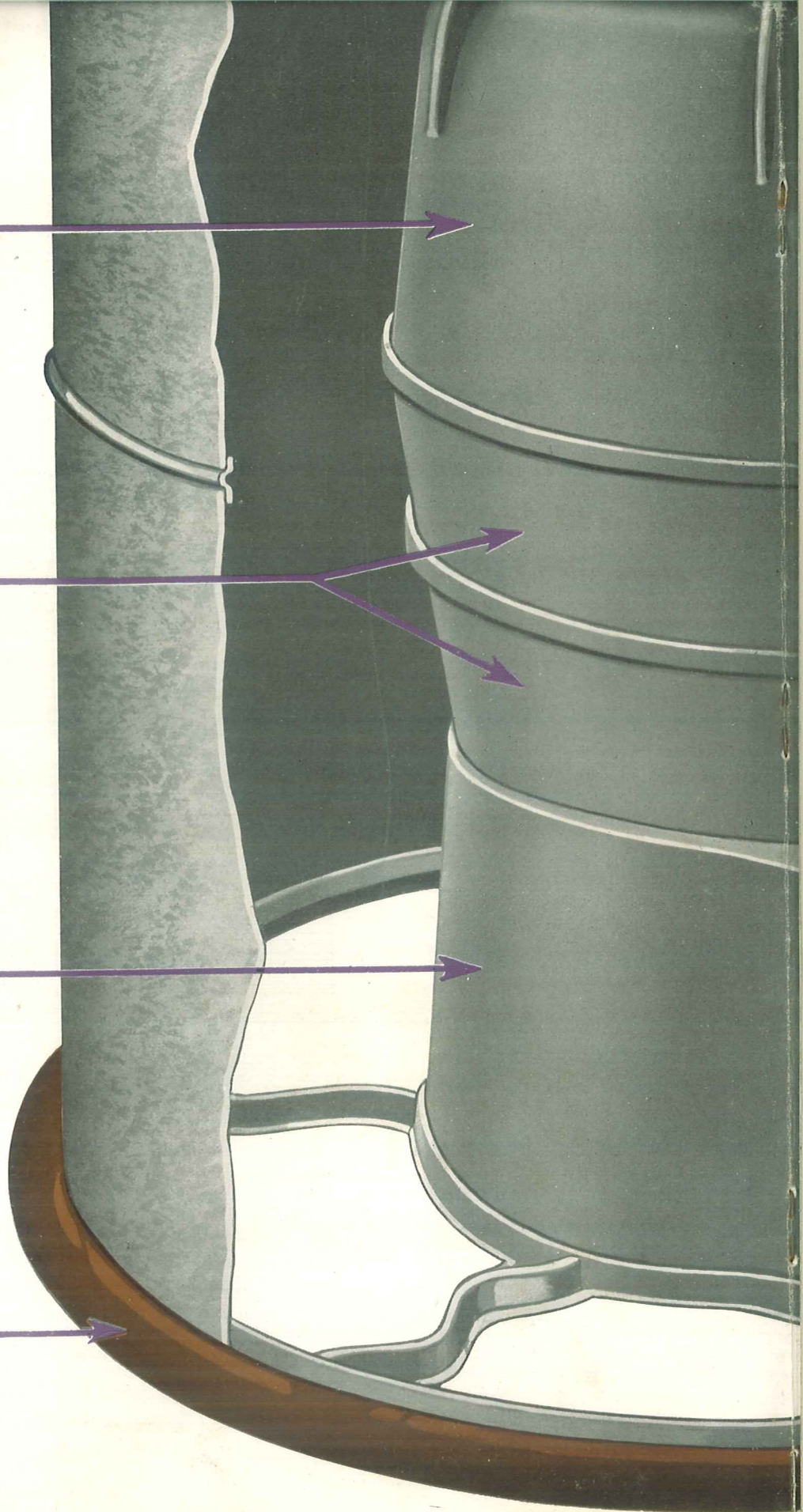
Extra Deep Ashpit, One Piece

Depth reduces danger of burning out grates, due to accumulation of ashes. Large door. Easy to remove ashes. Ash-pit section extends through front panel. Impossible for fine ashes to sift through into air circulating system.

Standard for pipe or pipeless

One-Piece Bottom

(On both pipe and pipeless furnaces). Prevents shifting and opening up of joints.





Standard for all sizes pipe or
pipeless

Air-Cooled Handle

The air-cooled handle hangs away from the door, never becoming too hot to grasp. No more burned fingers.

Large Humidifier

Insures moist, comfortable, healthful atmosphere.
Standard for all sizes pipe or
pipeless

Waist-High Shaker

Precisely balanced shaker gives easiest operation of grates. No more stooping over; no more dust annoyance.

Standard for pipe and pipeless

Front Panel

held in place without bolts. No cement, no leakage. Ashpit extends through panel eliminating possibility of dust entering air circulating system.

Ashpit Door

extra large to facilitate removal of ashes. Ashpit door and ashpit, surface ground, insuring tight joints.

Standard for all sizes pipe or
pipeless



The Royal Gold-brown and Gold Three-Way Heating System

The three-way heating system is one of the best modified pipe heating systems. It permits the return air supply to be taken from two or more rooms and insures thorough circulation without creating a draft of cold air over the floor.

The three-way heating system is available either with the Gold-brown and Gold finished ROYAL Furnace, including the upright shaker, or with the Jade Green and Gold finished ROYAL Furnace, including the short shaker.

The system comes complete with furnace and casing, extension, warm air and return air faces, return air pipe, collars and shoes. Complete data for the system is given on page 24.



Washed Air Heat!

with the

Royal-Zephyr Washed Air Heating System

Combining the Royal Furnace With the

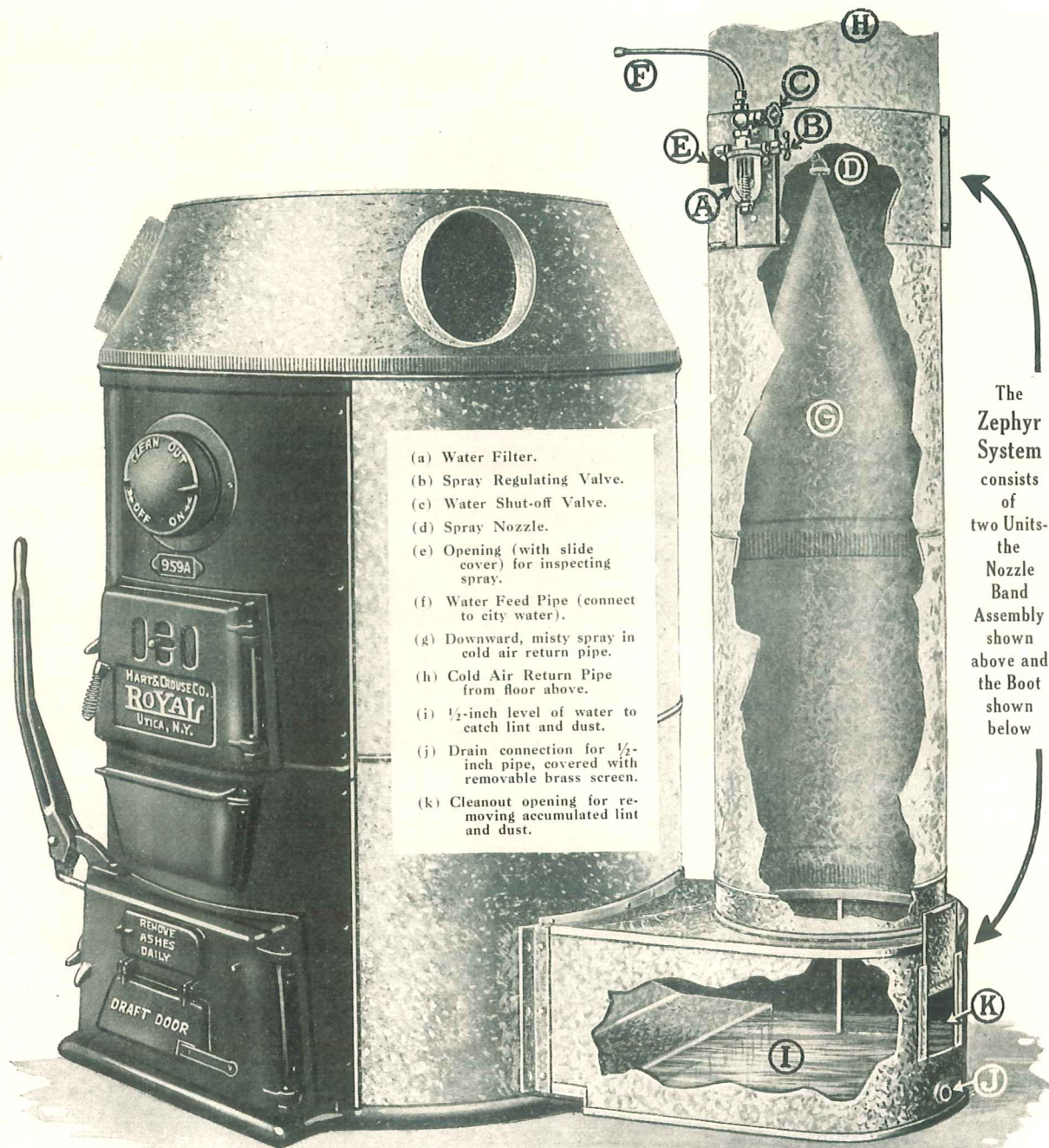
Zephyr Washed Air System

This combination provides for the three essential factors specified by the American Society of Heating and Ventilating Engineers as being necessary for health and comfort in the home during the heating season. These factors are:

1. EVEN TEMPERATURE
2. THOROUGH AIR CIRCULATION
3. CORRECT RELATIVE HUMIDITY

And the ZEPHYR does even more -- It washes out dust, dirt, lint, smoke and odors from the air and maintains a delightfully fresh, pure and invigorating atmosphere in the home all winter.

Write for new booklet telling the whole story of Humidity



The ROYAL-ZEPHYR System spray band assembly as shown, consists of spray nozzle, glass-enclosed water filter, control valve, regulating valve and copper tubing to water line. The nozzle is in the exact center of the cold air return pipe and creates a fine, misty, fog-like spray of water that completely fills the cold air return pipe.

The special boot at the bottom is designed to catch surplus water not evaporated, together with impurities washed from the air. The shoe retains one-half inch of water, the remainder going to open basement drain through screened drain connection. Drain screen is removable. A handy cleanout plate facilitates removal of dirt accumulation. A deflector plate extending inside the furnace casing directs the air current upward and around the hot castings and also prevents free particles of moisture from entering furnace air chamber.

The Zephyr Washed Air System

Combined With the Royal Furnace

Washes, heats and circulates pure, refreshing air throughout the home.

Removes lint, dust and dirt from the air which would otherwise be recirculated to the rooms.

Evaporates 10 to 20 gallons of water per day into the air and insures an average relative humidity of 40% or more in the home throughout the heating season.

Has no fans, motors nor moving parts to wear out or require attention.

Is economical to operate. The only cost of operation is for the water consumed. This amounts to only a few cents per month at water rates prevailing in most cities.

Saves fuel. An average relative humidity of 40% permits reducing the temperature standard from two to six degrees without lessening comfort. Lower temperatures mean less fuel consumption. The fuel saving more than compensates for the cost of water consumed.

Helps to eliminate coughs and colds.

Prevents drying out and consequent costly deterioration of furniture, walls and woodwork, musical instruments, radio, pictures, books, paintings, etc.

Prevents excessive wear on carpets, rugs and upholstery. Textile fabrics are very hygroscopic and become brittle when dried out.

Washes out cooking odors, tobacco odors, etc., from the air and maintains a clean, sweet atmosphere at all times.

Contributes more to the health, comfort and restful enjoyment of occupants of homes than any other home utility.

Is approved, endorsed and recommended by physicians, health authorities and heating and ventilating engineers.

Is highly recommended by hundreds of highly pleased users. Unsolicited testimonials offered as direct proof of user satisfaction.

CIRCULATION: The ZEPHYR increases the velocity of natural circulation through the furnace by 10 to 25%, depending upon water pressure and firepot temperature. The downward spray of water in the cold air return creates a suction or vacuum in the return air pipes that draws the air in at the cold air registers at a much faster rate and consequently forces a greater amount of air into the furnace air chamber to be heated and circulated out the warm air registers. This is the only heating system that increases air circulation without mechanical aid.

WATER EVAPORATION: The ZEPHYR evaporates from ten to twenty gallons of water per day into the air, or enough to provide an average relative humidity of 40% or more in a home of average size throughout the heating season. This amount of water vapor (from one-half to one gallon per hour) is actually discharged into the rooms through the warm air registers.

REGULATION AND CONVENIENCE OF OPERATION: After installing the ZEPHYR System it is simply necessary to adjust the spray control valve located on the filter, to deliver an even, cone-like spray. Afterwards control of the air washer is by opening or closing the shut-off valve. Humidity control is semi-automatic, as the more moisture the air contains the less it will evaporate in passing through the spray.

ACCESSIBILITY: Every part of the ZEPHYR System is readily accessible to the owner for adjustment or cleaning. The water filter may require cleaning about once a year, and the dirt accumulation in the bottom of the boot may have to be removed two or three times a year. Either of these operations requires only a few minutes time.

WATER CONNECTIONS: Only two plumbing connections are required -- the copper tube connected to the water filter is tapped into the city water supply, and the screened waste outlet of the boot is run to the open basement drain.

WATER CONSUMPTION: The ZEPHYR consumes only 3 1/2 to 5 gallons of water per hour, depending on city water pressure, and if operated continuously, twenty-four hours a day, the cost of operation amounts to but a few cents per month.

FUEL SAVING: Health authorities and heating and ventilating experts agree that an indoor temperature of 68 to 70 degrees with a relative humidity of 40 to 50% is far more comfortable and healthful than the prevailing dry-air indoor temperature of 72 to 80 degrees. The higher the temperature maintained the greater the heat leakage, and the greater the fuel consumption. A conservative estimate on the amount of fuel saved without sacrifice to comfort, by the new ROYAL-ZEPHYR Washed Air Heating System, is 10 to 25%. This saving more than compensates for the cost of water consumed.

MATERIALS: All the parts of the ZEPHYR Washed Air System are made of rust-resistant materials, and there are no moving parts to wear out. The ZEPHYR should last as long as the heating plant or the house in which it is installed. The assembly band is constructed of copper-bearing, galvanized iron. The spray nozzle and filter assembly are constructed of copper, brass and glass, which are impervious to action of water and time. The special ZEPHYR boot is built entirely of copper-bearing, galvanized iron.

The Model 1 ZEPHYR Washed Air System is sold in combination with ROYAL furnaces, but it may be purchased separately and installed on other warm air furnaces of all makes.

Why is heated air so dry? What percentage relative humidity is correct for health and comfort, and what is usually found? The answers to these important questions are in our new booklet. *Write for it today.*

Specification and Installation Details

Sizes

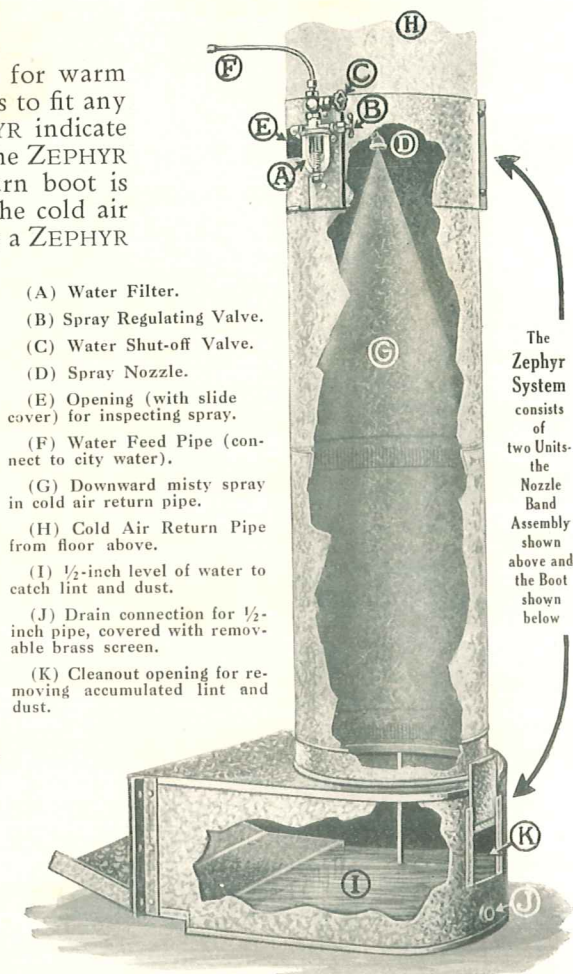
The Model 1 ZEPHYR Washed Air System, for warm air furnaces, is made in a complete range of sizes to fit any size of furnace. The rated sizes of the ZEPHYR indicate the diameter of the cold air return pipe which the ZEPHYR is made to fit. If more than one cold air return boot is necessary, one ZEPHYR installation in one of the cold air returns will deliver ample humidity. In ordering a ZEPHYR System for a furnace having an 18" cold air return, you would simply specify an 18" ZEPHYR System. The following sizes are carried in stock, ready for immediate shipment: 12", 14", 16", 18", 20", 22" and 24".

Spray Nozzle Band Assembly

This is a clamp band of proper size to clamp tightly around the cold air return pipe. This band must be placed at least 36" above the boot, and should be from 50" to 60" above boot if possible to place it that high. The section of cold air pipe between the nozzle band and boot must be vertical, as the spray does not work well in a slanting cold air pipe.

To install the nozzle band on cold air pipe, cut out a circular hole in the pipe about 4" in diameter to allow the nozzle pipe to project through to the center of the cold air pipe. Then clamp the nozzle band tightly around the pipe.

Connect the copper feed pipe to city water supply. The water pressure should be not less than 30 pounds to produce a good spray.



Special Boot

This boot displaces the ordinary boot or elbow used at the bottom of the cold air return. Fit the boot to the furnace casing, cutting away enough of the top of boot in the center to make it circular and the right shape to fit snugly to the casing. Cement the boot to the furnace casing to make tight, dust-proof joint.

Drain

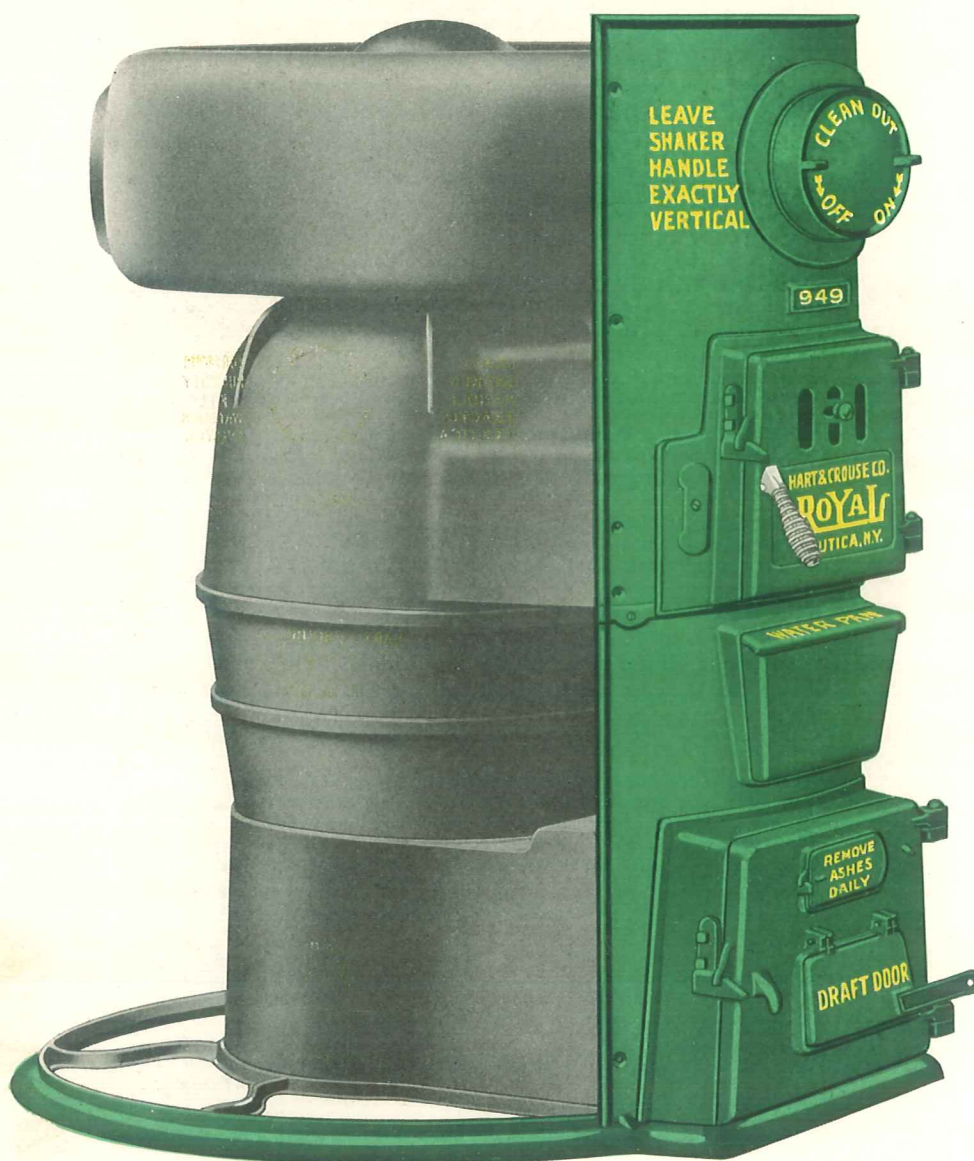
The boot is provided with screened drain connection, as the surplus water must be carried away to sewer. If the open basement drain is near the furnace, the 1/2" waste pipe may be run on top of the basement floor from the boot to the open drain. Otherwise, this waste pipe may be sunk into the floor by cutting a "trough" in the floor with a chisel, making this "trough" just wide enough and deep enough for the 1/2" pipe to fit down into it. This method of sinking the waste pipe into the floor places the top of the pipe flush with the floor. In new houses where the basement floor is not completed, the waste pipe may be laid under or in the cement floor.

Be sure the waste pipe is run to a trapped drain and not into an untrapped soil pipe.



The Royal Jade Green and Gold Furnace

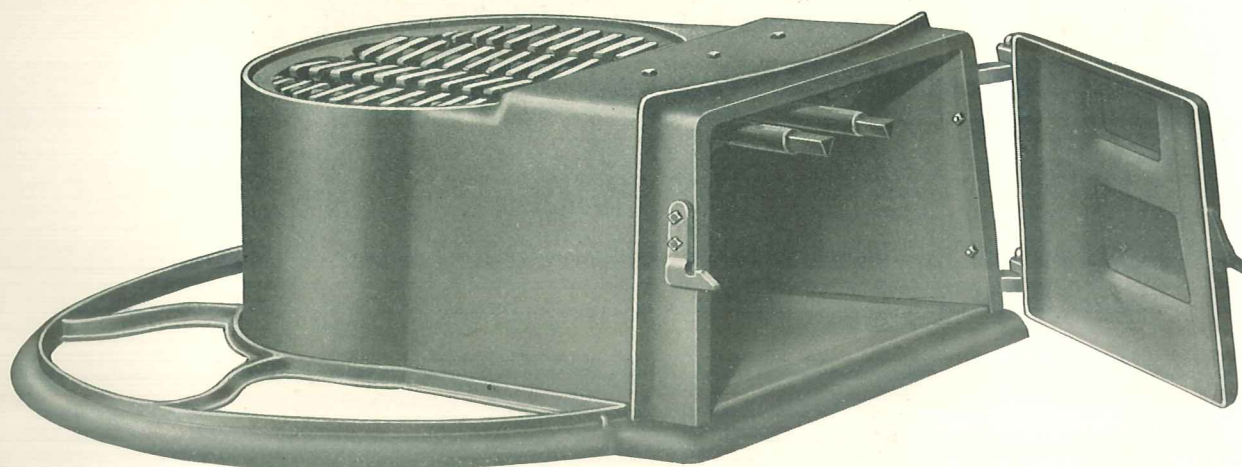
The handsome ROYAL Jade Green and Gold Furnace is built throughout in the same quality way as the ROYAL Gold-brown and Gold Furnace. The difference in the two types of furnaces is only in the grate. ROYAL Jade Green and Gold Furnaces have short, detachable grate shaker handles for operating the grates. Also each grate is triangular in shape and can be revolved completely. The triangular grate is heavy and durable, and affords a highly efficient clinker-crushing effect.



Castings of the Royal Jade Green and Gold Furnace

Careful inspection of the castings of the ROYAL Jade Green and Gold Furnace is invited. Their design is the reason for the ROYAL fuel economy, high furnace efficiency and the elimination of gas and dust leakage to the rooms of the home.

All of the castings of the ROYAL Jade Green and Gold Furnaces are interchangeable with corresponding sizes of ROYAL Gold-brown and Gold Furnaces except the grates and their assembly parts.



Triangular, Revolving Grates

ROYAL Jade Green and Gold Furnaces are equipped with heavy, triangular, revolving grates. This type of grate makes clinker-crushing easy. Each grate-bar may be individually removed quickly -- no bolts are used in the assembly.

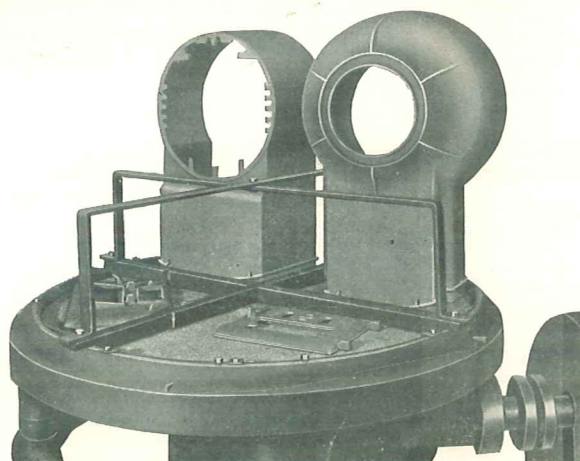
The one-piece ashpit presents the most durable construction. It is deep and roomy. The ashpit door, being the full size of the ashpit throat, permits convenient removal of ashes.

The throat of ashpit extends through the panel front and provides a gas and dust-proof connection.

Why Royal Doors Fit

Accurately and Tightly

ROYAL doors fit accurately and tightly because they are carefully machine surface-ground. The illustration shows the ashpit, combustion chamber, ashpit door and feed door being surface-ground. This is but one of the many operations that compel ROYAL Furnaces to be ready for quick erection when you receive them.





The Royal Jade Green and Gold Pipeless Furnace

The ROYAL Jade Green and Gold Pipeless Furnace is identical in construction with the ROYAL Gold-brown and Gold Pipeless, except in the grate arrangement. It is equipped with triangular, revolving, clinker-crushing grates, operated by a short, detachable shaker handle.

ROYAL Pipeless Furnaces are particularly well suited for compact homes, for stores, churches and other buildings that can be best heated by one register.

HART & CROUSE CO.

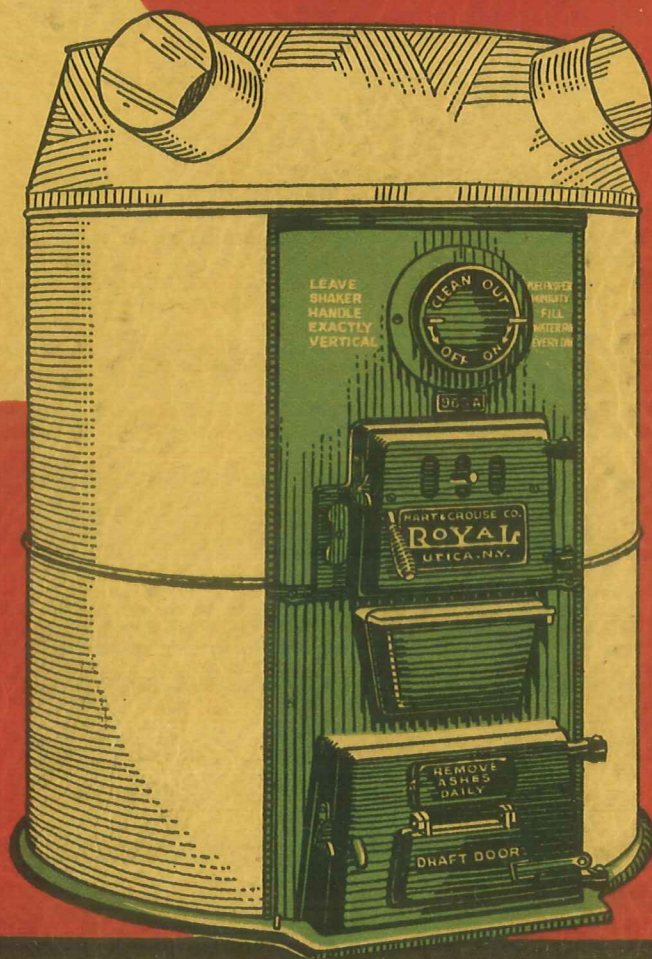
General Offices

UTICA / NEW YORK

Branch Offices

*BOSTON-----Room 454 Little Building
*CHICAGO-----1446 S. Canal Street
*CLEVELAND-----2022 East 22nd Street
*COLUMBUS-----Poplar Ave. and Henry Street
*DETROIT-----459 York Street
NEW YORK-----1510 Grand Central Terminal
*PHILADELPHIA-----3118 Chestnut Street
*PITTSBURGH-----7255 Frankstown Avenue
*WASHINGTON, D. C.---4th and Channing Sts., N. E.

* Warehouse in connection.



ROYAL

WARM AIR FURNACES

HART & CROUSE CO.

3118 Chestnut St. - - - Philadelphia, Pa.